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SYNOPSES OF NORTH-AMERICAN INVERTEBRATES.

J. S. KINGSLEY.

IV. ASTACOID AND THALASSINOID CRUSTACEA.

THE following synopsis, together with the one given in this journal for September, includes the whole macrurous fauna of North America north of the southern boundary of the United States and within the hundred-fathom line. Geographical distribution is indicated, as before, by full-faced letters : **N**, **M**, **S**, indicating the northern, middle, and southern Atlantic coast; **A**, **P**, **D**, corresponding divisions of the Pacific coast.

The Astacoid forms include those forms familiarly known as lobsters and crayfishes, as well as some others for which no common name is in general use. The crayfishes (genera Astacus and Cambarus) are inhabitants of fresh water; the others are marine. Most important of these is the lobster, once very abundant from New York northward, but now becoming much more rare, owing to overfishing and to disregard of the law prohibiting the taking of immature and egg-bearing animals.

The crayfish are fresh-water forms, occurring sparingly in New England and the southern British Provinces, and far more abundantly in the rest of our territory, where every stream and pond has its representatives. The discrimination of the species is not easy, and for the present we give no key to the fifty-one species described from our limits. The difficulties which surround the systematic arrangement of these forms can be seen from the fact that the late William Stimpson, our most accurate student of the Crustacea, would not touch the crayfish, remarking that either we had only one species of Cambarus in our country, or each mud puddle had its own species.

In the southern waters and on our Pacific coast the lobster is replaced by the Palinurids or spring lobsters, and by the flattened Scyllarids. These groups are frequently united by European carcinologists under the name Loricata. They are extremely interesting, on account of the peculiar leaf-like larvæ (Phyllosoma) which hatch from the eggs. In these the body is scarcely thicker than a sheet of this paper, but it may be two or three inches in length and half as broad.

The Thalassinids are marine burrowing forms, living in the sand and mud and frequently showing the effects of this life in the very soft and membranous integument, the pincers alone being hardened in some of these Crustacea.

The most important papers relating to the description of our American species are: —

MILNE-EDWARDS. Histoire Naturelle des Crustacés. Tome ii. 1837.
DANA. Crustacea of the United States Exploring Expedition. 1852.
STIMPSON. Crustacea of Pacific Coast. *Journ. Boston Soc. Nat. Hist.* Vol. vi. 1857.
HAGEN. Monograph of the North American Astacidæ. *Mem. Mus. Comp. Zoöl.* Vol. iii. 1870.
SMITH. Invertebrates of Vineyard Sound. *Rep. U. S. Fish Commission for 1871–72.*
SMITH. Preliminary Notice of Crustacea [etc.]. *Proc. U. S. Nat. Mus.* Vol. iii. 1881.
RANDALL. Catalogue of Crustacea [etc.]. *Journ. Acad. Nat. Sci. Philadelphia.* Vol. viii. 1839.
STIMPSON. Notes on North American Crustacea. *Annals N. Y. Lyc. Nat. Hist.* Vol. x. 1871.
GIBBES. *Proc. Am. Assoc. Adv. Sci.* Vol. iii, pp. 192–195. 1851.
KINGSLEY. *Bull. Essex Inst.* Vol. xxvii, p. 95. 1897. Vol. xiv, p. 131.
FAXON. A Revision of the Astacidæ. *Bull. Mus. Comp. Zoöl.* Vol. x. 1885.

KEY TO ASTACOID AND THALASSINOID CRUSTACEA OF THE UNITED STATES.

1. Macrura (see *Am. Nat.*, vol. xxxiii, p. 708) 2
2. Carapax with two longitudinal sutures; cervical suture frequently present; antennal scale small or wanting . . Thalassinoidea 12
2. Carapax without longitudinal sutures; cervical suture frequently present; antennal scale small or obsolete . . . Astacoidea 3
2. Carapax without sutures; antennal scale large Caridea (see p. 713).
3. Antennal scale usually present; anterior feet chelate; body sub-cylindrical; abdomen large . . . . Astacidæ 4

3. Antennal scale absent, anterior feet monodactyl 8
4. Hand of chelipeds large, broad, margins rounded, surface convex Astacinæ 5
4. Hands of chelipeds prismatic, sides nearly straight (Nephropsinæ) 7
5. Last thoracic segment not mobile; species marine . *Homarus* 17
5. Last thoracic segment free from the rest; fresh water . . 6
6. Branchiæ 17; species from the Atlantic water shed . *Cambarus* 22
6. Branchiæ 18; species from the Pacific slope . . *Astacus* 18
7. Antennal scale absent; chelipeds densely pubescent . *Nephropsis* 23
7. Antennal scale present; chelipeds naked and carinate *Nephrops* 24
8. Body strongly depressed, lateral portions of carapax thin, margins inflexed; antennæ lamellate . . . . . Scyllaridæ 10
8. Body and base of antennæ sub-cylindrical . . . Palinuridæ 9
9. Antennæ nearly touching at base; antennular flagella and rostrum short . . . . *Palinurus* 26
9. Antennæ remote; antennular flagella long; rostrum absent *Panulirus* 25
10. Carapax elongate or sub-quadrate 11
10. Carapax transverse, sides incised.[1]
11. Rostrum well developed; antennæ touching at the base; exopodite of external maxilliped with flagellum . . . . *Scyllarus* 27
11. Rostrum very short; antennæ remote; no flagellum to exopodite of external maxillipeds . . . . *Arctus* 28
12. Branchiæ thoracic; external maxillipeds pediform; caudal fin broad Gebidæ[2] 13
12. Branchiæ thoracic; external maxillipeds expanded operculiform; caudal fin broad . . . . Callianassidæ 16
13. Second pair of feet monodactyle, no antennal scale . . *Gebia* 34
13. Second pair of feet didactyle; a small antennal scale . . 14
14. Eyes normally pigmented 15
14. Eyes destitute of pigment and cornea . . . *Calocaris* 37
15. Hand of chelipeds regularly chelate . . . . . *Axius* 35
15. Hand sub-chelate, the pollex folding on the palm . *Naushonia* 36
16. Eyes sub-lamellate; antennular flagella longer than preceding joints; second pair of feet chelate . . . . . *Callianassa* 29
16. Eyes cylindrical; antennular flagella rather shorter than peduncle; second pair of feet chelate . . . . . *Callichirus* 33

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[1] *Ibacus parræ* (West Indies) and *Evibacus princeps* (Lower California) may occur within our limits.

[2] By the characters of the maxillipeds the genus Glypturus would belong in the family Gebidæ, but Stimpson gives no characters of second pair of feet or of presence or absence of an antennal scale. He compares it with *Callianassa grandimana*. *G. acanthochirus* comes from Florida. The writer has seen no specimens.

SYNOPSIS OF SPECIES.

Group ASTACOIDEA.

Family ASTACIDÆ. Sternum narrow; abdomen slightly narrower than cephalothorax.

Genus *Homarus* Milne-Edwards. Lobsters. Rostrum slender, conical, with a few teeth on sides.

17. . . . . *H. americanus* Milne-Edwards **N, M**

Genus *Astacus* (Fabr.) Milne-Edwards. First segment of abdomen with appendages. Species confined to Eurasia and the Pacific slope of America.

18. Margins of rostrum denticulate 19
18. Margins of rostrum not denticulate 20
19. Rostral acumen long; chela not barbate . *A. nigrescens* Stimpson
19. Rostral acumen short; chela barbate . . *A. gambeli* (Girard)
20. Rostrum short, with short acumen; postorbital ridge without posterior spine . . . . *A. klamathensis* Stimpson
20. Rostrum long, with long acumen; postorbital ridge with posterior spine or tubercle 21
21. Posterior spine of postorbital ridge long; cardiac areola half as broad as long . . . . *A. leniusculus* Dana
21. Posterior spine small or tubercular; areola one-third as broad as long *A. trowbridgii* Stimpson
22. Genus *Cambarus* Erichson. First segment of abdomen with appendages. Species confined to waters draining into the Atlantic. Fifty-one species and several varieties recognized by Faxon within our limits. Reference should be made to his monograph for identification.

Genus *Nephropsis* Wood Mason. Species from deep water.

23. Two pairs of lateral spines on rostrum . *N. aculeatus* Smith **M**

Genus *Nephrops* Leach.

24. . . . . *N. occidentalis* Randall[1]

Family PALINURIDÆ. Antennal base long, stout; sternum trigonal; none of the feet chelate. Tropical and temperate in our waters; animals of large size, familiarly known as spiny lobsters.

Genus *Panulirus* Gray.

25. No spine in median line of gastric region; posterior border of the lateral angles of abdominal segments with a single spine; basal joint of antennulæ very long . . . . . *P. americanus* (Lam.) **S**
25. Gastric region with seven spines, the middle one largest, sulci of abdominal segments interrupted in middle, except on last segment *P. interruptus* (Randall) **P, D**

Besides, *P. guttatus* and *P. argus* may occur in Florida. They have not been reported from there.

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[1] Described by Randall from "the west coast of North America." Probably was from the Hawaiian Islands. See *Bull. Essex Inst.*, vol. xiv, p. 131.

Genus *Palinurus* (Fabr.) Gray.

26. . . . . *P. longimanus* Milne-Edwards **S** (?)

Family SCYLLARIDÆ.

Genus *Scyllarus* Fabr. Branchiæ 21.

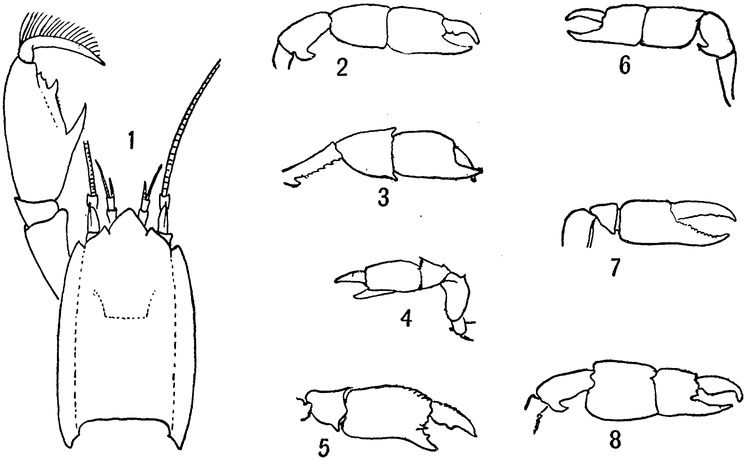
27. Gastric region without spines; posterior border of third abdominal segment regularly arcuate . . . *S. æquinoxialis* Fabr. **S**

27. Gastric region with bidentate projection; third abdominal segment with a strong knob . . . . *S. nodifer* Stimpson **S**

Genus *Arctus* Dana. Branchiæ 19.

28. Antepenult segment of antenna with two teeth on external margin; sternal segments without conspicuous spines *A. americanus* Smith **S**

28. Antepenult segment of antenna with three teeth, sternal segments with conspicuous spines . . . . . *A. depressus* Smith **M**



Chelæ of Thalassinoid Crustacea. — (1) Naushonia crangonoides; (2) Callianassa longimana; (3) Callianassa gigas; (4) Gebia affinis; (5) Gebia pugettensis; (6) Callianassa stimpsoni; (7) Axius serratus; (8) Callianassa californiensis.

Group THALASSINOIDEA.

Family CALLIANASSIDÆ.

Genus *Callianassa* Leach. Chelipeds unequal in size, carapace smooth and glossy.

29. Meros of larger cheliped serrate below, palm nearly twice length of carpus . . . . *C. grandimana* Gibbes **S**

29. Meros of larger cheliped with a strong proximal spine below . 30

30. Carpus and palm sub-equal 31

30. Carpus about twice the length of the palm 32

31. Meros short, tapering towards distal extremity; carpus without distal spines . . . . *C. longimana* Stimpson **P**

31. Meros long, broadest at distal end; carpus with distal spines above and below . . . . *C. gigas* Dana **P**

32. Height of carpus and palm sub-equal; no notch in palm below insertion of dactylus . . . . . *C. stimpsoni* Smith **M**

32. Carpus considerably higher than palm; a notch in palm just below articulation of dactylus . . . . . *C. californiensis* Dana **P**

Genus *Callichirus* Stimpson.

33. Body membranous; carpus and hand very long . *C. major* Say **M, S**

Family GEBIDÆ.

Genus *Gebia* Leach. Rostrum rough and hairy, chelipeds sub-equal.

34. Pollex with strong tooth on inner margin; carpus smooth above, with a strong distal spine . . . . . *G. pugettensis* Dana **P, D**

34. Pollex without tooth; carpus with a spine above, and five or six spines at tip . . . . *G. affinis* Say **M, S**

Genus *Axius* Leach.

35. Abdomen broader than carapax; no teeth on dorsal carina of carapax *A. serratus* Stimpson **N, M**

35. Abdomen narrower than carapax; dorsal carina toothed *A. armatus* Smith **M**

Genus *Naushonia* Kingsley.

36. . . . . *N. crangonoides* Kingsley **M**

Genus *Calocaris* Bell. Hand slender, pollex elongate; rostrum triangular.

37. . . . . *C. macandreæ* Bell **N**